Chapter

IPO ETFs: An Alternative Way to Enter the Initial Public Offering Business

Gerasimos G. Rompotis

Abstract

This chapter focuses on the initial public offerings (IPO) ETFs, which constitute an alternative way to enter the IPO business. Short- and long-term performance of ETFs is examined vis-a-vis the performance of major market indices. Three types of returns are computed; the absolute, benchmark-adjusted, and abnormal return. Returns are computed for the initial trading day and for the first 2, 3, 4, 5, 21, and 63 trading days. Long-run returns are also calculated for the first 6, 12, 18, and 24 months of trading and for the entire history of ETFs up to October 31, 2016 from a cumulative and a buy-and-hold perspective. Risk-adjusted returns are estimated with a six-factor model. The results indicate that the average first-day return is positive but below 1%. In the long run, the cumulative absolute returns are positive during the several intervals examined, whereas the cumulative benchmark-adjusted and abnormal returns are positive only for the first 6 months of trading. These returns become negative after the first 6 months. Going further, ETFs deliver significant buy-and-hold returns over the several periods examined. Finally, the results reveal that just one out of the four IPO ETFs examined can produce a robust and statistically significant alpha.

Keywords: initial public offerings, Exchange Traded Funds, performance, risk-adjusted returns

1. Introduction

Initial public offerings (IPOs) business has diachronically been of great interest to the investing community worldwide as investors deem IPOs as a great opportunity for significant short-term and possibly long-term gains. In addition, tens of tens of academic articles have been written on this field. The main finding of the literature is that IPOs are usually underpriced as depicted in their initial returns, which are significantly positive, either in absolute terms or when compared to corresponding non-IPO stocks or relevant market indices. Underpricing refers to the significantly low offer price of IPOs relative to the close price of stocks on their first trading day. On the contrary, when long-run returns are assessed, the academic research has shown that IPOs tend to underperform their reference portfolios.

This chapter focuses on IPO Exchange Traded Funds (IPO ETFs), which constitute an alternative vehicle for investors to enter the IPO business. An IPO ETF is an exchange traded fund that focuses on stocks of companies that have recently held an initial public offering. IPO ETFs are appealing to investors because they provide them

with an inexpensive and flexible tool to invest in a large pool of initial public offerings. On the contrary, investing in such a large number of IPOs individually would not be practically feasible due to the high cost of such a strategy. In addition, IPO ETFs enable robust diversification strategies against the highly volatile IPO market.

The origins of IPO ETFs go back to April 2006, when the First Trust US Equity Opportunities ETF was launched on the New York Stock Exchange (NYSE). The Renaissance IPO ETF came to the surface about 7 years later in October 2013. The Renaissance International IPO ETF followed 1 year later. The last entry in the IPO ETF market was the First Trust International IPO ETF. This fund began trading in November 2014.

In this chapter, we examine the short- and the long-term performance of IPO ETFs. In particular, we compute the absolute, benchmark-adjusted, and abnormal returns of ETFs. Abnormal returns are obtained with the usage of the market model successively against the S&P 500 Index and the S&P 600 Small Cap Index. These indices also serve as benchmarks when we calculate the benchmark-adjusted returns of ETFs. Moreover, in the short-run, returns are computed for the first trading day as well as for the first 2, 3, 4, 5, 21, and 63 trading days. At the long run, cumulative absolute, benchmark-adjusted, and abnormal returns are calculated over the first 6, 12, 18, and 24 months of trading and for the entire trading history of each ETF up to October 31, 2016. Respective buy-and-hold returns are computed too. Furthermore, risk-adjusted returns are estimated with the usage of a six-factor model, which follows the Fama and French multivariate model. Finally, a market trend analysis is performed. This analysis assesses the pricing behavior of IPO ETFs during the descending and the upward phases of the overall stock market.

The results show that IPO ETFs provide slightly positive average first-day returns given that the average initial return is positive but well below 1%. Going further, the average absolute return of IPO ETFs is positive over the first five trading days, but it is negative over the first 21 and 63 days of trading. Benchmark-adjusted returns are also positive up to 5 days when the S&P 500 Index is taken into consideration, but they are rather negative when the S&P 600 Small Cap Index is assessed. Finally, average abnormal returns are negative after the initial day of trading.

With respect to ETF long-term performance, results reveal positive cumulative absolute returns over the various periods considered, whereas the cumulative benchmark-adjusted and abnormal returns are positive only for the first 6 months of trading with the majority of returns becoming negative over the next time periods examined. In the case of buy-and-hold returns, results indicate that ETFs produce significant such returns in the long run, either when the absolute or the benchmark-adjusted returns are assessed. As far as risk-adjusted return is concerned, the regression analysis shows that just one out of the four IPO ETFs examined can produce robust and statistically significant excess return relative to market performance.

In the last step, the market trend analysis reveals that when the stock market goes down, the absolute return of IPO ETFs goes down too on about 76% of negative trading days. When market goes up, IPO ETFs go up to in a rate of about 63% of positive trading days. The opposite behavior is displayed by the benchmark-adjusted return of ETFs. This means that when the market goes down, the benchmark-adjusted returns of ETFs moves upward in a rate of about 68% of days and when market returns increase, the benchmark-adjusted performance of ETFs declines in a rate of about 65% of days. A similar one to benchmark-adjusted return's behavior is the case for abnormal returns.

To the best of our knowledge, this is the first study on IPO ETFs. Given the convenience of trading with ETFs, the low cost of investing in such products, the high liquidity of the ETF market in general and the great interest of investors and

researchers in IPOs, our study should be highly welcome by the investing community and researchers. In addition, the positive initial returns and, even more importantly, the significant buy-and-hold returns revealed by our study should help investors plot profitable trading strategies. Finally, the results of the market trend performance analysis could also help investors implement strategies with mighty potential of substantial gains.

The remainder of this chapter is structured as follows. Next section provides a brief literature review on IPOs performance in the United States and other international markets. Section 3 develops the methodology used in our empirical investigation. Section 4 describes the data used in this study and provides information about the trading features of the sample's ETFs. The empirical findings of our research are presented in Section 5 and the conclusions are discussed in Section 6.

2. Literature review

Given the lack of any research papers on IPO ETFs, we will provide a brief review of the main findings of the literature concerning the short- and long-run performance of IPOs worldwide.

A plethora of papers have examined the performance of IPOs using data from the United States. In early years, several studies, such as [1–7], have accentuated that IPOs are underpriced as can be inferred by the returns on their first trading days, which are significantly positive. In the same concept, [8] estimate that during 1990–1998, US IPOs left over $27 billion of money on the table, where the money left on the table is defined as the price gain of the first trading day times the number of shares sold. The money left on the table is translated into significant underpricing of IPOs during the nineties. Furthermore, [9] report that in the 1980s, the average initial return on IPOs was 7%, whereas the average first-day IPO return doubled to almost 15% during the period 1990–1998, before jumping to 65% during the internet bubble years of 1999–2000. Finally, [10] shows that, after the bubble of 1999–2000, the average initial return of IPOs in the US over the first decade of the new century was moving around 10%.

The short-run performance of IPOs in other developed and emerging markets has attracted the interest of researchers. Loughran et al. [11] show that the move by most East Asian countries to reduce regulatory interference in the setting of offering prices resulted in less short-run underpricing in the 1990s than in the 1980s. Ritter [10] shows that in China, the second largest economy of the world, underpricing of IPOs has been severe with initial returns amounting to up to 200%. However, over the recent years, IPO underpricing in China has started to decline as a result of the changing institutional constraints. The great underpricing of Chinese IPOs is also supported by the findings of [12, 13]. In Australia, Lee et al. [14] report strong first-day returns. Significant underpricing of IPOs is reported for Canada by [15] IPOs are underpriced in Japan too as evidenced by [16]. In the UK, Levis [17] has documented a significant underpricing of the companies going public in the British stock market. The same pattern has been revealed by [18] for Italy and [19] for France. More or less, IPO underpricing is a global phenomenon. To testify this assertion, Loughran et al. [20] report comprehensive statistical evidence of strong first-day IPO returns for a sample of 52 developed and emerging capital markets, which range from 3.3% in Russia to 239.8% in Saudi Arabia.

When it comes to the long-run performance of IPOs in the United States, the main conclusion of the literature is that that the stocks of companies going public tend to be overpriced in the long run. Overpricing is depicted in the underperformance of IPOs versus similar non-IPO stocks or relevant market indices. In this respect, Ibbotson

[21] provides evidence that the initial returns and the long-run performance of IPOs were negatively related during the period 1960–1969. Ritter [7] finds that IPO stocks significantly underperform a set of comparable companies over the 3 years after going public. Rajan and Servaes [22] reveal that over a 5-year period after going public, companies' underperformance relative to the market benchmarks ranges from 17% to 47.1%. Carter et al. [23] estimate an average underperformance of US IPOs over a three-year period after the initial offering of 19.92%. Gompers and Lerner [24] examine the performance for up to 5 years after listing of nearly 3661 IPOs in the US during the period 1935–1972 and find some evidence of underperformance when event time buy-and-hold abnormal returns are used but underperformance disappears when cumulative abnormal returns are utilized.

Outside the United Sates, in Australia, How et al. [25] compare the long-run performance of companies going public that payed a dividend and similarly matched firms, which did not pay a dividend revealing strong evidence that the paying firms perform significantly better than the nonpaying firms for a period up to 5 years after the dividend initiation date. Moshirian et al. [26] indicate that in China, Hong Kong, Japan, Korea, Malaysia, and Singapore, whilst there is initial underpricing in Asian IPOs, the existence of long-run underperformance depends on the methodology used. In Japan, Kirkulak [27] reports a three-year underperformance of −18.3% for the stocks listed between 1998 and 2001. In Canada, Kooli and Suret [28] find that investors who buy stocks immediately after their listing and hold these shares for a period of 3 years will incur a loss of about 20%. When a five-year buy-and-hold strategy is considered, underperformance amounts to −26.5%. In the United Kingdom, a number of studies such as those of [17, 29–31] have documented the existence of IPOs' long-run overpricing. Other studies on European IPOs, such as those of [32–34] for Germany, [35] for Austria, [36] for Spain, [18] for Italy, and [37] for France, also reveal significant long-run overpricing of IPOs. Overpricing is evidenced by their poor long-term performance compared to the performance of relevant market indices or reference stock portfolios. Based on these findings, IPOs would not be suitable for long-term buy-and-hold trading strategies.

3. Methodology

3.1 Short-term return analysis

In this section, we assess the short-term performance of IPO ETFs. In this respect, we compute the first day or initial return of ETFs. The first-day return does not necessarily refer to the return on the launch day of ETFs but refers to the return on the first trading day with no-zero volume because an ETF may have started actual trading on the days that followed its listing on the stock exchange.

Three alternative types of initial returns are computed. The first one refers to the absolute return of ETFs, which, based on [38], is defined as the gain or the loss on a portfolio achieved over a certain period without being compared to a reference portfolio or another benchmark. First-day absolute return is computed in percentage terms using the following formula:

$$IAR_{i,t=1} = \frac{CTP_{i,t=1} - OPEN_{i,t=1}}{OPEN_{i,t=1}} \quad (1)$$

where $IAR_{i,t=1}$ refers to the percentage absolute return of the ith ETF on its first trading day, $CTP_{i,t=1}$ refers to the close trade price of the ETF on its first trading day and $OPEN_{i,t=1}$ refers to the open trade price of this ETF on the same day.

The second type of initial return computed is the benchmark-adjusted return of ETFs, which, following [7], is computed as the difference between the initial absolute return of the *i*th ETF and the corresponding return of the benchmark. The first-day benchmark-adjusted return of ETFs is shown in the following formula:

$$BAIR_{i,t=1} = IR_{i,t=1} - BR_{t=1} \quad (2)$$

where $BAIR_{i,t=1}$ refers to percentage benchmark-adjusted return of the *i*th ETF on its first trading day, $IR_{i,t=1}$ is defined as above and $BR_{t=1}$ concerns the return of the market index on ETF's first trading day.

In our estimations of benchmark-adjusted returns, we employ two alternative stock indices to serve as benchmarks. The first one is the S&P 500 Index, which consists of the 500 largest companies in terms of market capitalization listed on the NYSE or NASDAQ. The second benchmark used is the S&P 600 Small Cap Index, which covers the small-cap range of US stocks. According to [39], indices that consist mostly of small cap companies are better benchmarks when assessing the performance of smaller stocks or portfolios. The S&P 600 Small Cap Index is used because the ETFs that have been selected to be studied are rather small-cap ETFs and, consequently, a small-cap index may be a more appropriate benchmark.[1]

In order to calculate the return of the index, which will correspond to ETF's first-day return, we use formula (1) for indices too. This means that given that the trading history of the selected benchmarks is much longer than the history of the sample's ETFs, we calculate the return of indices on ETF's first trading day by subtracting the open price of the index on the day which relates to ETF's first trading day from its close price on the same day and we divide by the open price.

The third type of initial return estimated is the abnormal return obtained with the usage of the market model. In order to estimate abnormal returns of ETFs, we follow the approach of [40]. More specifically, so as to estimate the abnormal returns of ETFs, we first need to estimate the time series market model expressed in Eq. (3), via which the return of ETFs is successively regressed on the return of the selected market indices:

$$R_i = \alpha_i + \beta_i R_m + \varepsilon_i \quad (3)$$

where R_i stands for the daily return of the *i*th ETF, R_m represents the return of the market index, namely the return of the S&P 500 Index or the S&P 600 Small Cap Index. We estimate market model to obtain the alpha and beta coefficients of each ETF, which we will then use to compute abnormal returns with the following model:

[1] As we will explain in a following section, each IPO ETF has its own benchmark and, thus, one could wonder why we do not use each ETF's own benchmark to estimate their benchmark-adjusted performance. We do not do so, for two reasons. The first one is that the majority of ETFs worldwide and IPO ETFs in particular are passively managed and, thus, the tracking error of these funds, that is the difference in returns between ETFs and underlying indices, is expected to be low. (We will see in **Table 1** that the tracking error of the sample's ETFs is indeed low.) Therefore, a new ETF's price will also generally remain in line with the price of the underlying basket of securities and an "underpricing" pattern like that observed in IPOs of ordinary stocks is not expected to be the case. The second reason is that we try to identify whether IPO ETFs can be an alternative investing tool of investors seeking returns, which will be better than the average market returns, with the market returns being usually represented by indices such as the two used in our analysis.

$$AR_{i,t=1} = R_{i,t=1} - \hat{\alpha}_i - \hat{\beta}_i R_{m,t=1} \quad (4)$$

where $AR_{i,t=1}$ is the abnormal return of the *ith* ETF on the first trading day, computed as the difference between the actual absolute return of ETF and the expected return based on the market model on the first trading day, $\hat{\alpha}_i$ and $\hat{\beta}_i$ are the parameters obtained from the market model. The estimation window of Eq. (4) covers the entire trading history of each ETF up to October 31, 2016.

After calculating the three types of ETFs' initial return, we then compute the average short-term returns of longer periods. More specifically, we compute the average daily returns of ETFs over the first 2, 3, 4, 5, 21 (i.e., 1 month), and 63 (i.e., 3 months) of trading. Similarly to the initial returns, we first calculate the absolute return of each ETF as follows:

$$AR_{i,t} = \frac{CTP_{i,t} - CTP_{i,t-1}}{CTP_{i,t-1}} \quad (5)$$

where $AR_{i,t}$ refers to percentage absolute return of the *i*th ETF on day *t* and $CTP_{i,t}$ refers to the close trade price of the ETF on the same day. Afterward, we estimate the benchmark-adjusted and abnormal returns of ETFs using the framework described in formulas (2), (3) and (4) above.

3.2 Long-term return analysis

The long-run performance of IPO ETFs is assessed in this section. Two types of long-run performance measures are employed in the analysis; cumulative average returns and buy-and-hold returns. The cumulative average return is calculated as in [41]. More specifically, we calculate the average daily return of each ETF for each calendar month during its entire trading history excluding the launch month of ETF and starting from the month that follows the initial trading of the fund. Following [30], we do so to allow for the possibility of price support in the first few trading days. The cumulative average return starting on the first trading day of the month following the listing of the *ith* ETF and extending to T months after the listing is the summation of the average returns in each month:

$$CAR_i = \sum_{t=2}^{T} AMR_t \quad (6)$$

where CAR_i refers to the cumulative average return of the *i*th ETF and AMR_t is the average daily return of the fund in month *t*.

We note that we calculate three alternative types of cumulative returns, which are the cumulative absolute return, the cumulative benchmark-adjusted return and the cumulative abnormal return following the framework described in the previous section. Again, two benchmarks are used; the S&P 500 Index and the S&P 600 Small Cap Index. Moreover, we compute cumulative returns over the first 6 months (i.e., 126 trading days), 12 months (i.e., 252 trading days), 18 months (i.e., 378 trading days), and 24 months (i.e., 504 trading days) of the trading history of each ETF as well as over its entire trading history up to October 31, 2016.

In order to calculate the buy-and-hold return of ETFs, we assume that an investor buys ETF shares on their listing day and holds them up to a specific time interval, which, in our case, ranges from 6 months to the entire trading history of

each ETF (as above). The buy-and-hold return is estimated in percentage terms using a formula similar to formula (5). The key difference between the two calculations concerns the estimation window. This means that, for instance, in the case of the first 6-month period, buy-and-hold return is computed by considering the percentage difference in the close trade prices of the *i*th ETF between the first and the 126th trading day after the month of ETF's listing on the stock exchange, in the case of the 12-month period, buy-and-hold return is computed by considering the percentage difference in the close trade price of the *i*th ETF between the first and the 252nd trading day after the month of ETF's listing, and so on. A last note is that, similarly to cumulative returns, we estimate the buy-and-hold return in its absolute, benchmark-adjusted and abnormal forms.

3.3 Risk-adjusted performance analysis

The risk-adjusted performance of IPO ETFs is evaluated in this section with the usage of an augmented Fama and French model. This model is based on the model developed by [42] to which the [43] Momentum factor, a Conservative Minus Aggressive factor and a Robust Minus Weak factor have been added. The model is shown in Eq. (7):

$$R_i - R_f = \alpha_i + \beta_{1,i}\left(R_m - R_f\right) + \beta_{2,i}SMB + \beta_{3,i}HML + \beta_{4,i}UMD + \beta_{5,i}CMA + \beta_{6,i}RMW + \varepsilon_i \quad (7)$$

where R_i and R_m are defined as above, R_f is the risk-free rate expressed by the 1-month US Treasury bill rate, SMB (Small Minus Big) is the average return on nine small cap portfolios minus the average return on nine big cap portfolios, HML (high minus low) is the average return on two value portfolios (in book-to-market equity terms) minus the average return on two growth portfolios, UMD is the average of the returns on two (big and small) high prior return portfolios minus the average of the returns on two low prior return portfolios,[2] CMA (Conservative Minus Aggressive) is the average return on two conservative portfolios minus the average return on two aggressive portfolios and RMW (Robust Minus Weak) is the average return on two robust operating profitability portfolios minus the average return on 2-weak operating profitability portfolios.[3]

In the [42] model, the size effect implies that small cap firms exhibit returns that are superior to those of large firms. Theoretical explanations for the small size effect suggest that the stocks of small firms are less liquid and trading in them generates greater transaction costs; there is also less information available on small companies and, thus, the monitoring cost of a portfolio with small stocks is generally greater than the cost of a portfolio of large firms.

The book-to-market equity ratio effect captured by the HML factor implies that the average returns on stocks with a high book-value to market-value equity ratio must be greater than the returns on stocks with a low book-value to market-value equity ratio. The high book-value firms are considered to be underpriced by the market and, therefore, they constitute appealing buy-and-hold targets, as their

[2] Big means that a firm is above the median market cap on the NYSE at the end of the previous day while small firms are below the median NYSE market cap.

[3] The historical daily data of the risk-free rate, the Fama and French three factors, the Carhart momentum factor, the robust minus weak factor and the conservative minus aggressive factor are available on the website of Kenneth French (http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html).

price is expected to rise later. This anomaly undermines the semi-strong form efficiency of the stock market.

The existence of momentum in asset prices is an anomaly which has not been explained sufficiently by the finance theory. The difficulty in explaining the momentum anomaly is that, as the efficient capital markets theory suggests, an increase in the price of an asset cannot be indicative of a further increase in future prices. Behavioral finance has offered some possible explanations to the existence of the momentum anomaly. In particular, investors are assumed to be irrational and, consequently, they underreact to the release of new information failing to incorporate new information in the prices of their transactions.

The Conservative Minus Aggressive and Robust Minus Weak factors correspond to the [44] investment and operating profitability factors. [44] use past investment as a proxy for the expected future investment and, based on valuation theory, they suggest that CMA implies a negative relation between the expected investment and the expected internal rate of return. Furthermore, based on the findings of [44], a negative loading is expected for the RMW factor, that is, the excess return of IPO ETFs must be affected by the profitability factor in a negative fashion.

The usage of Eq. (7) aims at capturing the market elements that can affect the performance of IPO ETFs and considering whether these funds can produce any meaningful above market returns, which will be represented by a positive and statistically significant alpha. With respect to the latter, [44] assert that if an asset pricing model fully captures expected returns, the intercept of the model should be indistinguishable from zero in a regression of an asset's excess return on the factor returns of the model.

The model is successively run for six different time periods. The first period concerns the first 21 trading days of each ETF excluding the month in which the ETF began trading on the exchange. We do so as we did when we estimated the long-run performance of ETFs above to allow for the possibility of price support in the first few trading days. This month is also excluded from all the other time intervals over which Eq. (7) is applied.

The second interval assessed concerns the first 63 trading days of each ETF. The third period examined regards the first 6 months of trading, that is, the first 126 trading days of each fund. The next period taken into consideration covers the first 12 months of trading data. In our analysis, the intervals ranging up to 1 year can be considered as a short-term investment horizon. Looking for more long run, we run the model for a period covering the first 18 and the first 24 months of each ETF's trading records. Finally, we run Eq. (7) over the entire history of each ETF so as to define the overall buy-and-hold risk-adjusted performance of ETFs.

3.4 Market trend return analysis

In the last step, we perform a "market trend" analysis of IPO ETF returns by examining how the return of ETFs responds to the decreasing or increasing swings of the overall stock market as the latter is alternatively represented by the S&P 500 Index and the S&P 600 Small Cap Index.

In our analysis, we first sort the daily returns of benchmark and then compute the number and portion of daily returns of each ETF that are negative or equal to zero and the number and portion of positive ETF daily returns during the descending path and during the ascending path of the stock market. If ETFs follow the market closely, they are expected to decline when the market declines and vice versa. Similarly to the short- and long-term performance analysis in the previous sections, we use three alternative types of returns, which are the absolute, benchmark-adjusted and abnormal return.

4. The sample

The sample of the study includes the four IPO ETFs available in the US capital market. **Table 1** presents the profiles of ETFs. Presented in the table are the ticker, name of each ETF, name of tracking index, inception date, age in years, expense ratio, average daily volume in number of traded shares, and the historical tracking error of ETFs, which is the difference in returns between ETF and benchmark based on information on historical performance of ETFs before taxes and benchmark returns from each ETF's inception up to December 31, 2015. The information on ETFs' ticker, name, benchmark, inception date, and expense ratio as well as on the historical performance of ETFs and underlying indices has been found on the websites of ETFs' managing companies.

Moreover, **Table 1** reports the trading frequency of ETFs that is calculated as the fraction of trading days with nonzero volume to the total trading history (in days) for each fund, the average intraday volatility computed as the percentage fraction of the highest minus the lowest trade price of each fund on day t to its close trade price on the same day, and the fraction of each ETF's intraday volatility to the intraday volatility of the S&P 500 Index and the S&P 600 Small Cap Index, respectively. The last ratios help assessing whether IPO ETFs are more volatile than the market or not. The time series of daily volumes, open, high, low, and close prices of ETFs and the S&P 500 Index have been found on the website of NASDAQ. The historical data of the S&P 600 Small Cap Index have been obtained from Yahoo! Finance.

Regarding the underlying assets of ETFs, we note that the first fund tracks the Renaissance US IPO Index, which reflects approximately the top 80% of newly public firms based on full market capitalization. The second ETF follows the Renaissance International IPO Index, which is a portfolio of the top 80% non-US-listed newly public companies, prior to their inclusion in global core equity portfolios. The third ETF seeks to replicate the return of the IPOX®-100 US Index. This index measures the performance of the top 100 largest, typically best performing and most liquid US IPOs during their first 1000 trading days. The last IPO ETF examined tracks the IPOX International Index, which measures the performance of the 50 largest and typically most liquid companies domiciled outside the US within the IPOX Global Composite Index during their first 1000 trading days. All the indices above are reconstituted and adjusted quarterly and companies that have been public for 2 years (in the case of the Renaissance indices) or 1000 days (in the case of the IPOX®-100 US Index and IPOX International Index) are removed.

The average age of ETFs is equal to 4.42 years with the oldest one being the First Trust US Equity Opportunities ETF, which was launched in April 2006. The rest funds are 3 years old at a maximum indicating that this niche of the ETF market is very young but possibly very prosperous. The average expense ratio is modest being equal to 0.68%. In addition, the ETFs tracking non-US-listed IPOs are more expensive than their domestically allocated peers. This cost superiority of domestic ETFs is not surprising as it has been observed in the case of the "traditional" ETFs both in and outside the US.

Moreover, **Table 1** shows that an average number of about 16,000 ETF shares are traded every day with the First Trust US Equity Opportunities ETF being the more tradable fund in the sample. The concentration of trading to the most aged fund may be the result of the advantage of this ETF in terms of information availability relative to the younger funds and may indicate that investors deem this ETF as more prosperous based on its amassed trading experience.

Going further, the average raw tracking error of the sample is equal to −0.56%. The negative sign means that the average ETF underperforms its benchmark by 56 basis points (bps). Among the four ETFs in the sample, only one outperforms its

Ticker	Name	Benchmark	Inception date	Age	Expense ratio
IPO	Renaissance IPO ETF	Renaissance US IPO Index	10/14/13	3.049	0.60%
IPOS	Renaissance International IPO ETF	Renaissance International IPO Index	10/6/2014	2.071	0.80%
FPX	First Trust US Equity Opportunities ETF	IPOX®-100 US Index	4/12/2006	10.562	0.60%
FPXI	First Trust International IPOX ETF	IPOX International Index	11/4/2014	1.992	0.70%
Mean				**4.418**	**0.68%**
Ticker	**Name**	**Benchmark**	**Volume**	**Tracking error**	**Trading freq.**
IPO	Renaissance IPO ETF	Renaissance US IPO Index	13,273	−1.12%	99.61%
IPOS	Renaissance International IPO ETF	Renaissance International IPO Index	461	0.12%	55.36%
FPX	First Trust US Equity Opportunities ETF	IPOX®-100 US Index	37,016	−0.68%	98.87%
FPXI	First Trust International IPOX ETF	IPOX International Index	14,605	−0.56%	78.64%
Mean			**16,339**	**−0.56%**	**83.12%**
Ticker	**Name**	**Benchmark**	**Intraday volatility**	**ETF Int. Vol/ S&P 500 Int. Vol**	**ETF Int. Vol/ S&P 600 Int. Vol**
IPO	Renaissance IPO ETF	Renaissance US IPO Index	1.101	1.232	0.976
IPOS	Renaissance International IPO ETF	Renaissance International IPO Index	0.486	0.568	0.515
FPX	First Trust US Equity Opportunities ETF	IPOX®-100 US Index	1.098	0.934	0.740
FPXI	First Trust International IPOX ETF	IPOX International Index	0.574	0.644	0.527
Mean			**0.815**	**0.844**	**0.689**

This table presents the profiles of IPO ETFs, which include their ticker, name, benchmark, inception date, age as at October 31, 2016, expense ratio, average daily volume, historical tracking error, i.e., difference in performance between ETF and its benchmark, since each ETF's inception up to December 31, 2015, trading frequency calculated as the fraction of trading days with nonzero volume to the total trading history (in days) for each fund, average intraday volatility calculated as the percentage fraction of the highest minus the lowest trading price of each fund on day t to its close price on the same day, and the fraction of each ETF's intraday volatility to the intraday volatility of the S&P 500 Index and the S&P 600 Small Cap Index, respectively.

Table 1.
Profiles of ETFs.

benchmark by 12 bps. As a comment on tracking error, we should point out that the literature has accentuated that tracking error is an unavoidable event for ETFs given that their returns are usually calculated free of expenses and transaction costs while

index returns reflect no costs at all. In addition, other factors, such as the different time schedules between the stock exchanges on which the shares of ETFs and the underlying securities are traded, especially in the case of ETFs tracking nondomestic market indices, can hamper the effort of ETFs to efficiently replicate the performance of their benchmarks.

When it comes to trading frequency, **Table 1** reports an average term of 83%. This percentage indicates that there is a considerable amount of days on which ETFs present nil trading activity. These findings are in line with the low volumes discussed above. The next trading feature concerns the intraday volatility of ETFs, which is equal to 0.815 on average terms. Surprisingly enough, the international IPO ETFs are less volatile than their domestically allocated peers. This is a new finding as the relevant ETF literature has provided strong evidence that ETFs tracking international indices are riskier than those that track indices from the local stock market. In any case, however, both the average and the individual intraday volatility calculations are quite low showing that IPO ETFs can be a relatively safe haven for equity investors when the overall capital market is in turbulence. This claim can be verified by the ratios of ETFs' intraday volatility to those of the two Standard and Poor's indices taken into consideration. In both cases, the average ratios are below unity, whereas only one out of eight single ratios is greater than unity indicating that IPO ETFs are less volatile than the market.

5. Empirical results

5.1 Short-term return analysis

Table 2 presents the estimations of IPO ETFs' short-term performance. Specifically, the table reports the three types of initial returns, that is, the first-day absolute, benchmark-adjusted, and abnormal return along with the corresponding average returns over the first 2, 3, 4, 5, 21, and 63 trading days.

As far as absolute returns are concerned, **Table 2** shows that the average initial return of the sample is positive amounting to 29 bps. This positive mean term indicates a favorable response to the launch of these alternative investing tools on behalf of investors. However, it should be noted that, when focusing on the performance of individual funds, we can see that the absolute initial return can be either negative or positive and ranges from −0.35% for the Renaissance International IPO ETF to 1.45% for the Renaissance IPO ETF.

After the first trading day, the average absolute return of the sample remains positive up to the first 5 days and becomes negative when the 1- and 3-month periods are assessed. In addition, after the third day, average absolute return starts deteriorating. At the fund level, most of the longer-term average returns are positive for the Renaissance International IPO ETF and the First Trust US Equity Opportunities ETF, they are steadily negative for the Renaissance International IPO ETF, while returns are mixed in the case of the First Trust International IPOX ETF.

When it comes to benchmark-adjusted returns, **Table 2** reports a positive average initial return for the sample, either when the S&P 500 Index or the S&P 600 Small Cap Index is the benchmark into consideration. In addition, when the latter index is used, the average initial return of the sample is about double the respective return when the S&P 500 Index is used to compute the benchmark-adjusted returns of IPO ETFs. At the fund level, only the First Trust International IPOX ETF produces negative benchmark-adjusted return, whereas the rest of ETFs can beat the market on their first trading day.

Absolute returns					
Period	**IPO**	**IPOS**	**FPX**	**FPXI**	**Mean**
t_1	1.446	−0.348	0.299	−0.250	**0.287**
t_2	0.944	−0.184	0.175	−0.125	**0.202**
t_3	1.103	−0.731	0.398	0.285	**0.264**
t_4	0.714	−0.706	0.471	0.213	**0.173**
t_5	0.604	−0.614	0.475	0.171	**0.159**
t_{21}	0.092	−0.046	−0.072	−0.029	**−0.014**
t_{63}	0.163	−0.021	−0.119	−0.111	**−0.022**

Benchmark-adjusted returns										
	Benchmark: S&P 500 Index					**Benchmark: S&P 600 Small Cap Index**				
Period	**IPO**	**IPOS**	**FPX**	**FPXI**	**Mean**	**IPO**	**IPOS**	**FPX**	**FPXI**	**Mean**
t_1	0.209	1.041	0.222	−0.285	**0.297**	1.500	0.925	0.056	−0.274	**0.552**
t_2	−0.012	−0.362	0.283	−0.299	**−0.098**	0.512	−0.492	0.027	−0.308	**−0.065**
t_3	0.247	−0.162	−0.099	0.146	**0.033**	0.409	−0.155	−0.528	0.154	**−0.030**
t_4	0.070	0.008	0.048	0.127	**0.063**	0.225	−0.006	−0.483	−0.050	**−0.078**
t_5	−0.026	0.286	0.113	0.091	**0.116**	0.151	−0.005	−0.236	0.133	**0.011**
t_{21}	−0.133	−0.171	−0.085	−0.097	**−0.122**	−0.054	−0.398	−0.077	0.001	**−0.132**
t_{63}	0.029	−0.058	−0.065	−0.127	**−0.055**	0.051	−0.124	−0.009	−0.144	**−0.056**

Abnormal returns										
	Benchmark: S&P 500 Index					**Benchmark: S&P 600 Small Cap Index**				
Period	**IPO**	**IPOS**	**FPX**	**FPXI**	**Mean**	**IPO**	**IPOS**	**FPX**	**FPXI**	**Mean**
t_1	0.199	0.167	0.194	−0.236	**0.081**	1.495	0.043	0.083	−0.236	**0.346**
t_2	−0.017	−0.252	0.252	−0.183	**−0.050**	0.580	−0.275	0.028	−0.180	**0.038**
t_3	0.244	−0.521	−0.120	0.244	**−0.038**	0.516	−0.553	−0.321	0.253	**−0.026**
t_4	0.070	−0.442	0.025	0.200	**−0.037**	0.302	−0.490	−0.269	0.125	**−0.083**
t_5	−0.025	−0.281	0.089	0.161	**−0.014**	0.223	−0.425	−0.086	0.179	**−0.028**
t_{21}	−0.126	−0.095	−0.114	−0.032	**−0.092**	−0.029	−0.150	−0.114	0.008	**−0.071**
t_{63}	0.038	−0.037	−0.096	−0.087	**−0.046**	0.071	−0.050	−0.075	−0.101	**−0.039**

This table presents the return of IPO ETFs on their first trading day, i.e., the first day with positive trading volume, calculated in percentage terms as the fraction of the close trade price minus the opening trade price to the opening trade price, as well as the average absolute (daily) return over the first 2, 3, 4, 5, 21 (i.e., 1 month), and 63 (i.e., 3 months) days of each ETF's trading history. Then, the table presents the benchmark-adjusted returns of ETFs, i.e., ETF return minus benchmark return, over the same intervals using as alternative benchmarks the S&P 500 Index and the S&P 600 Small Cap Index. Finally, the table presents the abnormal returns of IPO ETFs estimated with the market model.

Table 2.
Short-term return analysis.

Furthermore, **Table 2** reports mixed results about longer-run benchmark-adjusted returns. For instance, when the 2-day period is considered and the S&P 500 Index is used as the benchmark, the returns of three ETFs are negative (two return estimates in the case of the S&P 600 Small Cap Index). In the case of the 3-day investment window, returns are mixed. In the case of the 4-day period and the S&P 500 Index, all the average returns are positive while over longer periods, whatever the benchmark may be, the majority of benchmark-adjusted returns are negative.

The abnormal returns of ETFs behave similarly to benchmark-adjusted returns. The average first-day abnormal return of the sample is positive irrespective of the index incorporated in the market model to estimate abnormal returns. In addition, the average abnormal return of the sample based on the S&P 600 Small Cap Index is more than three times the respective average return when the S&P 500 Index is taken into consideration. Scanning through the single ETF returns, we observe that three out of four funds deliver significant first-day profits, which range from 17 bps for the Renaissance International IPO ETF to 20 bps for the Renaissance IPO ETF.

At the longer-run level, abnormal returns mimic the benchmark-adjusted returns quite closely. For instance, similarly to benchmark-adjusted returns, the average 2-day abnormal returns based on the S&P 500 Index is negative for three out of four ETFs (the same ETFs as in the case of benchmark-adjusted performance). Returns over other frequencies up to 5 days are either negative or positive without allowing us to detect any specific pricing trend. However, when it comes to longer periods reaching one or 3 months, average returns become negative.

The main conclusion that can be reached by the analysis of the various types of short-term returns is that, on average, significant gains can be realized on the first trading day of IPO ETFs. However, gains diminish or even vanish when longer periods, such as 1 month or 3 months of trading, are assessed. Based on these findings, we could claim that IPO ETFs may be suitable for day traders but not for investors with a short-term horizon, which does not exceed 3 months.

5.2 Long-term return analysis

The long-run performance of ETFs is assessed in this section. The relevant estimations of cumulative and buy-and-hold returns over a 6-month, 12-month, 18-month, and 24-month period are presented in **Table 3** along with the corresponding returns over the entire trading history of ETFs. Cumulative returns are presented from an absolute, benchmark-adjusted, and abnormal perspective. On the other hand, buy-and-hold returns are reported in their absolute and benchmark-adjusted form.

We note that, as shown in **Table 1**, the Renaissance International IPO ETF is about 2 years old. This means that the total trading history of this fund coincides with the 24-month subperiod considered in our analysis. Moreover, the trading history of the First Trust International IPOX ETF is less than 2 years and, thus, we cannot compute returns over a 24-month period for this fund.

When it comes to cumulative absolute returns, the results in **Table 3** indicate that IPO ETFs can produce positive such returns. In particular, the average return over the first 6 months of trading approximates 30 bps. Average returns are also positive for the rest intervals considered as well as over the entire trading history of ETFs. In addition, except for the First Trust International IPOX ETF, the funds of the sample provide positive cumulative returns over the several time periods assessed. The First Trust International IPOX ETF presents a positive cumulative absolute return only over the first 6 months of trading.

When the cumulative benchmark-adjusted returns are considered, **Table 3** reports mixed results. For example, the average historical return (i.e., over the total trading history up to October 31, 2016) of the sample is positive when the S&P 500 Index is taken into consideration, but it becomes negative when the S&P 600 Small Cap Index is the reference portfolio. Moreover, three (two) out of four funds underperform the S&P 500 Index (the S&P 600 Small Cap Index).

In the case of cumulative abnormal returns, the results in **Table 3** indicate that the average IPO ETF underperforms the S&P 500 Index, but it performs better than the S&P 600 Small Cap Index up to 24 trading months. However, the average IPO

Cumulative absolute returns

Period	IPO	IPOS	FPX	FPXI	Mean
6 months	0.292	0.564	0.186	0.143	**0.296**
12 months	0.621	0.147	0.707	−0.541	**0.233**
18 months	0.927	−0.021	1.168	−0.741	**0.333**
24 months	0.404	0.007	1.009	N/A	**0.474**
Total period	0.219	0.007	5.718	−0.478	**1.366**

Cumulative benchmark-adjusted returns

	Benchmark: S&P 500 Index					Benchmark: S&P 600 Small Cap Index				
Period	**IPO**	**IPOS**	**FPX**	**FPXI**	**Mean**	**IPO**	**IPOS**	**FPX**	**FPXI**	**Mean**
6 months	−0.058	0.380	−0.106	0.027	**0.061**	0.105	0.387	0.134	−0.159	**0.117**
12 months	−0.018	−0.105	0.081	−0.626	**−0.167**	0.281	−0.067	0.315	−0.808	**−0.070**
18 months	−0.008	−0.182	0.338	−0.899	**−0.188**	0.278	−0.170	0.678	−1.073	**−0.072**
24 months	−0.486	−0.337	0.625	N/A	**−0.066**	−0.141	−0.406	1.012	N/A	**0.155**
Total period	−0.824	−0.337	2.350	−0.712	**0.119**	−0.623	−0.406	1.287	−0.925	**−0.167**

Cumulative abnormal returns

	Benchmark: S&P 500 Index					Benchmark: S&P 600 Small Cap Index				
Period	**IPO**	**IPOS**	**FPX**	**FPXI**	**Mean**	**IPO**	**IPOS**	**FPX**	**FPXI**	**Mean**
6 months	0.004	0.483	−0.278	0.276	**0.121**	0.151	0.528	−0.078	0.157	**0.189**
12 months	0.107	0.029	−0.262	−0.199	**−0.081**	0.369	0.117	−0.034	−0.368	**0.021**
18 months	0.180	−0.117	−0.178	−0.244	**−0.090**	0.430	−0.013	0.128	−0.452	**0.024**
24 months	−0.229	−0.170	−0.074	N/A	**−0.158**	0.014	−0.048	0.106	N/A	**0.024**
Total period	−0.434	−0.170	−1.301	0.141	**−0.441**	−0.388	−0.048	−2.297	−0.119	**−0.713**

Buy-and-hold absolute returns					
Period	**IPO**	**IPOS**	**FPX**	**FPXI**	**Mean**
6 months	5.468	12.174	3.261	2.549	**5.863**
12 months	13.251	0.040	14.773	−11.786	**4.070**
18 months	17.409	−4.058	25.445	−15.965	**5.708**
24 months	7.241	−4.078	19.417	N/A	**7.527**
Total period	−0.246	−4.078	158.585	−11.786	**35.619**

Buy-and-hold benchmark-adjusted returns										
	Benchmark: S&P 500 Index					**Benchmark: S&P 600 Small Cap Index**				
Period	**IPO**	**IPOS**	**FPX**	**FPXI**	**Mean**	**IPO**	**IPOS**	**FPX**	**FPXI**	**Mean**
6 months	7.294	3.539	5.987	2.033	**4.713**	3.428	3.211	0.213	5.966	**3.204**
12 months	14.888	4.262	13.405	0.621	**8.294**	7.982	3.313	7.147	4.422	**5.716**
18 months	18.953	1.639	17.577	1.537	**9.926**	11.450	1.004	8.434	4.919	**6.452**
24 months	19.784	5.357	5.721	N/A	**10.287**	11.559	6.341	−3.974	N/A	**4.642**
Total period	21.042	5.357	62.226	2.834	**22.865**	14.830	6.341	83.129	6.763	**27.766**

This table presents the cumulative absolute returns of IPO ETFs over the first 6, 12, 18, and 24 months of their trading history as well as over their entire trading history up to October 31, 2016. Cumulative benchmark-adjusted and cumulative abnormal returns relative to the S&P 500 Index and the S&P 600 Small Cap Index, respectively, are presented too. Finally, the table presents the buy-and-hold absolute and benchmark-adjusted returns of ETFs over the several periods considered.

Table 3.
Long-term return analysis.

ETF as well as the individual funds fails to derive positive abnormal returns over their entire trading history irrespective of the market index used to estimate abnormal returns. At the fund level, three and two ETFs provide investors with a positive cumulative abnormal return against the S&P 500 Index over the 6- and 12-month period, respectively, but returns are basically negative over the rest time intervals examined. In the case, of the S&P 600 Small Cap Index, only one ETF can produce consistent cumulative abnormal returns over a 24-month investment horizon.

After discussing cumulative returns, we focus on the buy-and-hold returns of IPO ETFs. One element revealed in **Table 3** is that the average ETF derives significant buy-and-hold absolute returns, which range from 4.07% over the 12-month period to 35.62% over the entire trading history examined. Moreover, all the individual ETFs present positive buy-and-hold absolute returns over the first 6-month trading period, three funds offer positive returns during the first year of their trading, and two ETFs achieve positive returns during the 18- and 24-month periods. However, when the entire trading history of ETFs is considered, just the First Trust US Equity Opportunities ETF provides a significant positive buy-and-hold absolute return, which approximates 159%.[4]

On the question of how the buy-and-hold benchmark-adjusted returns of ETFs behave, **Table 3** reports significant such returns over the several intervals investigated. With only one exception, all the return estimates of each single ETF are positive. Moreover, the average IPO ETF produces a mean buy-and-hold benchmark-adjusted of 23 and 28% against the S&P 500 Index and S&P 600 Small Cap Index, respectively, over the whole trading history of ETFs up to October 31, 2016. At the fund level, the First Trust US Equity Opportunities ETF is the most profitable ETF in the sample. The historical buy-and-hold benchmark-adjusted return of this fund amounts to 62 and 83% in the case of the S&P 500 Index and the S&P 600 Small Cap Index, respectively.[5]

Overall, the analysis of long-run performance reveals that IPO ETFs can be suitable investment choices for investors looking for substantial long-term profits from entering the IPO business. More importantly, the findings on buy-and-hold benchmark-adjusted returns indicate that IPO ETFs can beat the overall stock market over shorter or longer periods. This pattern should be highly welcome by investors who always seek for alternative investment tools to perform above the market.

---

[4] The rest ETFs present significantly negative buy-and-hold absolute returns. However, the magnitude of the positive return of the First Trust US Equity Opportunities ETF is that big so that the average historical buy-and-hold absolute return of the sample be equal to 36%.

[5] A comment that can be made with respect to the First Trust US Equity Opportunities ETF significantly outperforming its peers (in the case of the S&P 500 Index, the mean benchmark-adjusted outperformance of this fund over other ETFs in the sample is equal to 45.81% whereas, in the case of the S&P 600 Small Cap Index, average outperformance approximates 67%), concerns the age of this ETF. In particular, as we have seen in the previous sections, this ETF was the pioneer in the IPO ETF business and has more than 10 years of trading records. The performance superiority of the oldest fund in the sample over its younger peers from a buy-and-hold benchmark-adjusted perspective resembles the long-run performance advantage of the companies going public after several years of operation as private non-listed firms. The findings of several studies such as those of [23, 45–47] provide strong evidence of a positive relationship between a firm's age and its long-run performance. Obviously, an ETF has no operating history before its inception on a stock exchange. That said, after inception, the trading experience accumulated to an ETF seems to be a decisive factor that can affect its performance. In our study, the very small size of the sample (just four funds) does not allow running a cross-sectional regression of ETFs' long-run performance on their age to obtain statistical support of our assertion about the return of aged ETFs against their young counterparts.

5.3 Risk-adjusted performance analysis

The results of the six-factor regression model are provided in **Table 4**. The table includes the alpha coefficient along with the estimates of the explanatory variables of the model. Probabilities on the statistical significance of estimates are provided too along with R-squared on the sufficiency of the model to explain the performance of IPO ETFs. Finally, the results are presented for each ETF over the several estimation windows considered and against the two different market indices employed in our analysis.

When it comes to excess performance, **Table 4** shows that most of the average alpha estimates over the several subperiods examined are positive either when the S&P 500 Index is the benchmark in the model or the S&P 600 Small Cap Index is used as a proxy for the market return. However, at the fund level, most of the individual alphas are insignificant both in statistical and economic terms. Based on this element, we conclude that IPO ETFs fail to deliver any above market return. However, this conclusion does not apply to the First Trust US Equity Opportunities ETF. Over the 6-month estimation window or longer, the alpha estimates of this fund are positive and statistically significant at the 10% or better indicating that this ETF can beat the market. We remind that this ETF is the oldest among the funds in the sample. Thus, the assertion about the positive relationship between the age of IPO ETFs and their long-run performance is verified by the results of regression analysis.

With respect to systematic risk, the beta estimates presented in **Table 4** are all positive with the majority of them being significant at the 5% or better. Moreover, a wide fluctuation in betas is observed among the various subperiods examined. However, in each single period as well as over the entire trading history of each ETF, there is a convergence in betas obtained from using the two alternative market benchmarks. At the sample level, the average beta coefficients are below unity indicating that IPO ETFs are more conservative than the market. Conservativeness implies that investors choosing IPO ETFs are relatively protected during declining paths of the overall stock market. This finding is in line with the ratios of ETFs' intraday volatility to that of benchmarks in **Table 1**, where we saw that ETFs are less volatile than the market indices. Therefore, our assertion about IPO ETFs standing as a relative safe haven for equity investors during turbulent markets is verified by the estimations of systematic risk via regression analysis.

Going further, when the S&P 500 Index represents the stock market in the model, the effect of the size factor on the performance of ETFs seems to be significant only in the case of the Renaissance IPO ETF and the First Trust US Equity Opportunities ETF. For these funds, the coefficients of the SMB factor are constantly positive, while most of them are significant at the 10% or better. The positive and significant effect of the size factor on the performance of at least two ETFs in the sample is in line with our expectations given that, according to Fama and French (2015), the SMB slopes are strongly positive for small stocks (and slightly negative for big stocks), and that the ETFs examined are indeed small cap or even very small cap.[6] When the S&P 600 Small Cap Index is used as the market

[6] Based on the definition of "small capitalization" offered by Investopedia, a small cap firm is a company with a capitalization of between $300 million and $2 billion (http://www.investopedia.com/terms/s/small-cap.asp). As of 5 January, 2017, the ETFs in our sample have a minimum of Net Assets of $1.9 million in the case of the Renaissance International IPO ETF and a maximum of assets of $633.6 million in the case of the First Trust US Equity Opportunities ETF (according to information found on the website of ETFs' managing companies). Based on these figures, it is obvious that the ETFs in the sample stand as small cap portfolios and, consequently, the positive sign of the SMB estimates for at least two funds is a reasonable finding.

Benchmark: S&P 500 Index								
1 month	**Alpha**	**Beta**	**SMB**	**HML**	**UMD**	**CMA**	**RMW**	**R_2**
IPO	−0.090	1.085[a]	0.002	−0.671	0.260	−2.190[a]	0.441	0.850
IPOS	0.153	0.304	−0.589	−1.828	−0.474	−0.366	−0.385	0.206
FPX	0.153	0.639[a]	0.095[a]	−1.025[b]	0.415[c]	−0.440	0.307	0.795
FPXI	−0.117	1.184[a]	0.100	−0.157	0.006	−0.334	0.709	0.608
Mean	**0.025**	**0.803**	**−0.098**	**−0.920**	**0.052**	**−0.833**	**0.268**	**0.615**
3 months	**Alpha**	**Beta**	**SMB**	**HML**	**UMD**	**CMA**	**RMW**	**R_2**
IPO	0.087	0.799[a]	0.095	−0.116	0.464[a]	−1.600[a]	−0.139[a]	0.688
IPOS	0.029	0.436[a]	0.230	−0.609	−0.066	0.154	−0.050	0.184
FPX	0.042	0.879[a]	0.222	−0.130	0.377[a]	−0.093	−0.696[a]	0.878
FPXI	−0.148[c]	0.200	−0.174	−0.253	−0.120	0.284	0.105	0.082
Mean	**0.002**	**0.579**	**0.093**	**−0.277**	**0.164**	**−0.314**	**−0.195**	**0.458**
6 months	**Alpha**	**Beta**	**SMB**	**HML**	**UMD**	**CMA**	**RMW**	**R_2**
IPO	0.044	0.755[a]	0.209[c]	−0.155	0.487[a]	−0.613[b]	−0.445[b]	0.813
IPOS	0.084	0.291[a]	0.064	−0.105	−0.074	−0.050	−0.214	0.132
FPX	0.087[a]	0.949[a]	0.472[a]	−0.155	0.168[b]	−0.538[a]	−0.621[a]	0.870
FPXI	−0.040	0.287[b]	0.097	−0.389	−0.162	−0.138	0.234	0.039
Mean	**0.044**	**0.570**	**0.211**	**−0.201**	**0.105**	**−0.335**	**−0.262**	**0.463**
12 months	**Alpha**	**Beta**	**SMB**	**HML**	**UMD**	**CMA**	**RMW**	**R_2**
IPO	0.003	0.831[a]	0.117	−0.278[b]	0.205[b]	−0.874[a]	−0.749[a]	0.808
IPOS	0.042	0.405[a]	0.000	−0.516[b]	−0.160	0.485	−0.235	0.065
FPX	0.047[b]	0.902[a]	0.436[a]	−0.175	0.207[a]	−0.367[a]	−0.502[a]	0.862
FPXI	−0.048	0.403[a]	−0.063	−0.538[a]	−0.240[a]	0.441[c]	0.174	0.164
Mean	**0.011**	**0.635**	**0.122**	**−0.377**	**0.003**	**−0.078**	**−0.328**	**0.475**
18 months	**Alpha**	**Beta**	**SMB**	**HML**	**UMD**	**CMA**	**RMW**	**R2**
IPO	0.001	0.869[a]	0.215[a]	−0.185[c]	0.042	−1.008[a]	−0.547[a]	0.738
IPOS	0.021	0.330[a]	−0.096	−0.225	−0.107	−0.073	−0.477[b]	0.064
FPX	0.037[c]	0.908[a]	0.490[a]	−0.047	0.224[a]	−0.293[a]	−0.423[a]	0.850
FPXI	−0.066	0.406[a]	−0.039	−0.159	−0.144	−0.061	−0.028	0.202
Mean	**−0.002**	**0.628**	**0.143**	**−0.154**	**0.004**	**−0.359**	**−0.369**	**0.464**
24 months	**Alpha**	**Beta**	**SMB**	**HML**	**UMD**	**CMA**	**RMW**	**R_2**
IPO	−0.017	0.893[a]	0.364[a]	−0.307[a]	−0.101[b]	−0.576[a]	−0.486[a]	0.742
IPOS	−0.003	0.309[a]	−0.023	−0.129	−0.118[c]	−0.128	−0.409[b]	0.070
FPX	0.037[c]	0.949[a]	0.402[a]	−0.124[c]	0.188[a]	−0.480[a]	−0.516[a]	0.830
FPXI	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mean	**0.005**	**0.717**	**0.248**	**−0.187**	**−0.010**	**−0.395**	**−0.470**	**0.547**
Total period	**Alpha**	**Beta**	**SMB**	**HML**	**UMD**	**CMA**	**RMW**	**R_2**
IPO	−0.017	0.900[a]	0.443[a]	−0.150[b]	−0.121[a]	−0.596[a]	−0.440[a]	0.728
IPOS	−0.003	0.309[a]	−0.023	−0.129	−0.118[c]	−0.128	−0.409[b]	0.070
FPX	0.021[a]	0.962[a]	0.279[a]	−0.179[a]	0.053[a]	−0.346[a]	−0.245[a]	0.698

Benchmark: S&P 500 Index								
24 months	**Alpha**	**Beta**	**SMB**	**HML**	**UMD**	**CMA**	**RMW**	**R_2**
FPXI	−0.031	0.507[a]	0.020	−0.098	−0.132[b]	0.105	−0.158	0.267
Mean	**−0.008**	**0.669**	**0.180**	**−0.139**	**−0.080**	**−0.241**	**−0.313**	**0.441**
Benchmark: S&P 600 Small Cap Index								
1 month	**Alpha**	**Beta**	**SMB**	**HML**	**UMD**	**CMA**	**RMW**	**R_2**
IPO	−0.022	1.003[a]	−0.918[a]	−0.521	0.246	−2.693[a]	0.512	0.791
IPOS	0.195	0.270	−0.753	−1.596	−0.343	−0.185	−0.350	0.205
FPX	0.125[a]	0.631[a]	−0.335	−0.910[b]	0.423	0.019	0.400	0.722
FPXI	−0.096[a]	0.862[b]	−0.868[c]	−0.410	−0.078	−0.519	0.364	0.559
Mean	**0.050**	**0.691**	**−0.718**	**−0.859**	**0.062**	**−0.845**	**0.232**	**0.569**
3 months	**Alpha**	**Beta**	**SMB**	**HML**	**UMD**	**CMA**	**RMW**	**R_2**
IPO	0.078	0.893[a]	−0.822[b]	−0.393	0.351	−1.309[a]	−0.603	0.694
IPOS	0.010	0.441[a]	−0.322[c]	−0.834[b]	−0.076	0.361	−0.301	0.207
FPX	0.025	0.783[a]	−0.434[b]	−0.021	0.360[a]	−0.157	−0.860[a]	0.875
FPXI	−0.154[b]	0.215[b]	−0.413[b]	−0.310	−0.111	0.330	0.052	0.088
Mean	**−0.010**	**0.583**	**−0.498**	**−0.389**	**0.131**	**−0.194**	**−0.428**	**0.466**
6 months	**Alpha**	**Beta**	**SMB**	**HML**	**UMD**	**CMA**	**RMW**	**R_2**
IPO	0.042	0.749[a]	−0.610[a]	−0.324	0.534[a]	−0.550[c]	−0.534[b]	0.816
IPOS	0.084	0.284[a]	−0.229	−0.143	−0.069	−0.073	−0.279	0.131
FPX	0.058[a]	0.845[a]	−0.323[b]	−0.181	0.288[a]	−0.235	−0.613[a]	0.861
FPXI	−0.047	0.272[b]	−0.162	−0.396	−0.158	−0.173	0.205	0.037
Mean	**0.034**	**0.537**	**−0.331**	**−0.261**	**0.149**	**−0.258**	**−0.305**	**0.461**
12 months	**Alpha**	**Beta**	**SMB**	**HML**	**UMD**	**CMA**	**RMW**	**R_2**
IPO	0.004	0.782[a]	−0.706[a]	−0.463[a]	0.249[a]	−0.798[a]	−0.869[a]	0.797
IPOS	0.033	0.416[a]	−0.421[a]	−0.626[b]	−0.187[c]	0.518	−0.280	0.068
FPX	0.047[a]	0.857[a]	−0.394[a]	−0.226[c]	0.269[a]	−0.250[b]	−0.584[a]	0.850
FPXI	−0.071	0.382[a]	−0.285[b]	−0.547[a]	−0.234[a]	0.042	0.282	0.169
Mean	**0.003**	**0.609**	**−0.451**	**−0.465**	**0.025**	**−0.122**	**−0.363**	**0.471**
18 months	**Alpha**	**Beta**	**SMB**	**HML**	**UMD**	**CMA**	**RMW**	**R_2**
IPO	0.002	0.827[a]	−0.649[a]	−0.359[a]	0.041	−0.944[a]	−0.720[a]	0.731
IPOS	0.015	0.331[a]	−0.433[a]	−0.301	−0.132[b]	−0.046	−0.520[a]	0.065
FPX	0.031	0.877[a]	−0.383[a]	−0.092	0.259[a]	−0.219[a]	−0.463[a]	0.833
FPXI	−0.077	0.404[a]	−0.447[a]	−0.248[b]	−0.187[a]	−0.067	−0.087	0.206
Mean	**−0.007**	**0.610**	**−0.478**	**−0.250**	**−0.005**	**−0.319**	**−0.448**	**0.459**
24 months	**Alpha**	**Beta**	**SMB**	**HML**	**UMD**	**CMA**	**RMW**	**R_2**
IPO	−0.020	0.859[a]	−0.521[a]	−0.504[a]	−0.170[a]	−0.572[a]	−0.641[a]	0.729
IPOS	−0.007	0.304[a]	−0.331[a]	−0.200	−0.147[b]	−0.112	−0.454[a]	0.069
FPX	0.031	0.919[a]	−0.505[a]	−0.184[b]	0.192[a]	−0.414[a]	−0.543[a]	0.816
FPXI	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mean	**0.002**	**0.694**	**−0.453**	**−0.296**	**−0.042**	**−0.366**	**−0.546**	**0.538**

Benchmark: S&P 600 Small Cap Index								
24 month	**Alpha**	**Beta**	**SMB**	**HML**	**UMD**	**CMA**	**RMW**	**R_2**
Total period	**Alpha**	**Beta**	**SMB**	**HML**	**UMD**	**CMA**	**RMW**	**R_2**
IPO	−0.019	0.853[a]	−0.431[a]	−0.335[a]	−0.203[a]	−0.591[a]	−0.606[a]	0.714
IPOS	−0.007	0.304[a]	−0.331[a]	−0.200	−0.147[b]	−0.112	−0.454[b]	0.069
FPX	0.023[a]	0.912[a]	−0.630[a]	−0.301[a]	0.013	−0.352[a]	−0.372[a]	0.681
FPXI	−0.037	0.497[a]	−0.484[a]	−0.219[c]	−0.184[a]	0.132	−0.240	0.272
Mean	**0.002**	**0.694**	**−0.453**	**−0.296**	**−0.042**	**−0.366**	**−0.546**	**0.538**

This table presents the results of a six-factor performance regression model. The daily excess return of IPO ETFs is successively regressed on the excess return of the S&P 500 Index or the S&P 600 Small Cap Index, and the Fama&French SMB (small minus big) factor, the Fama&French HML (high minus low book-to-price ratio) factor, the Carhart UMD (momentum) factor, the Fama&French CMA (conservative minus aggressive) factor, and the Fama&French RMW (robust minus weak) factor. The model is run over the first month, 3 months, 6 months, 12 months, 18 months, and 24 months of each ETF's trading history excluding the month of each ETF's launch on the stock exchange. The model is also run over the entire trading history of each ETF up to October 31, 2016 also excluding the month of each ETF's launch on the stock exchange.
[a]indicates statistical significance at 1% level.
[b]indicates statistical significance at 5% level.
[c]indicates statistical significance at 10% level.

Table 4.
Risk-adjusted performance analysis.

portfolio, the results about the SMB factor are opposite to those just discussed. All the individual estimates are negative with the majority of them being statistically significant. This pattern was not expected but it could possibly be considered by the correlation of the SMB factor with the S&P 600 Small Cap Index.[7] This means that the effect of the size factor may be expressed by the positive slope of the market index.[8]

On the impact of the value factor on performance of IPO ETFs, the relevant estimates of the HML variable are all negative with most of them being statistically significant at the 10% or better, especially when the 12-month or longer estimation windows are considered. This finding applies to both versions of the model, namely either when the S&P 500 Index or the S&P 600 Small Cap Index is used. Based on Fama and French [44], the strongly negative slope of the HML factor indicates that IPO ETFs may be deemed as to resemble low B/M (i.e., book-to-market) growth stock portfolios. This is true given that the stocks that comprise the underlying indices of IPO ETFs are usually small cap companies that go public with strong perceived potential for significant growth in the future.

The next variable considered is the momentum factor of Carhart. The majority of the relevant sample average estimates are positive, especially in the short-run, namely over periods up to 12 months. In the long run, the average momentum coefficients are negative. A negative sample average is obtained when the entire trading history of each ETFs is taken into consideration when running the performance regression model. At the fund level, when the first version of the model is assessed (i.e., the one with the S&P 500 Index), about half of the momentum

[7] We have computed an average correlation between the SMB and the S&P 600 Small Cap Index of 0.55 over the various time intervals that correspond to the trading history of each ETFs under examination.

[8] To verify that the results reported with the usage of the S&P 600 Small Cap Index are not spurious, we run performance regressions after detracting the SMB variable from the model. The results obtained do not differ significantly from those reported in **Table 4**.

estimates up to the 18-month investment window are positive and statistically significant. After this period, only the First Trust US Equity Opportunities ETF presents a stable positive relationship with the momentum factor, whereas the rest three ETFs are negatively related to this factor. This is also the case when the S&P 600 Small Cap Index is the reference market portfolio in the model. The main conclusion reached though analyzing the results about the momentum factor is that IPO ETFs follow the trends of the overall stock market in the short-run, but in the long-run, the pricing behavior of that products can deviate from the market.

When it comes to the Conservative Minus Aggressive factor, the results indicate a rather negative impact on IPO ETF performance. The majority of CMA estimates are negative when the S&P 500 Index is the market portfolio in the model. Moreover, 12 out 27 single CMA estimates are statistically significant. More or less, the same results are obtained when we use the S&P 600 Small Cap Index in regressions. The negative sign of the CMA variable is in accordance with our expectations for a negative relationship between the performance of IPO ETFs and the CMA factor based on the suggestions of Fama and French [44] about a negative relationship between expected investment and expected rate of return.

Finally, as far as the impact of Robust Minus Weak factor on performance of IPO ETFs is concerned, the results in **Table 4** reveal a negative such effect. In both versions of the model, the majority of the relevant RMW estimates are negative and statistically significant (15 and 14 out of 27 individual estimates in the case of the S&P 500 Index and the S&P 600 Small Cap Index, respectively). This finding is in accordance with our expectations about a negative relationship between the performance of ETFs and RMW. According to Fama and French [44], the combination of negative CMA and RMW slopes in the performance regression model (as is the case in our analysis) indicates that the returns of IPO ETFs resemble the returns of those firms that invest a lot despite their low profitability.

5.4 Market trend return analysis

The outcomes of the market trend return analysis are provided in **Table 5**. The results are presented for absolute, benchmark-adjusted and abnormal returns over the descending and ascending paths of the S&P 500 Index and the S&P 600 Small Cap Index, respectively. For each single ETF and over each market path, the number and percentage of days with negative (or zero) and positive returns are displayed along with the corresponding average negative and positive returns.

To begin with, when the S&P 500 Index declines, the average IPO ETFs declines too on 75.31% of the corresponding trading days. The average absolute return on these negative days amounts to −86 bps. During the negative days of the S&P 500 Index, ETFs present an average positive absolute return on 24.69% of negative trading days. When the market goes up, IPO ETFs move upward too on 62.08% of the respective positive days delivering an average return of 102 bps. Moreover, during the positive path of the S&P 500 Index, ETFs move opposite to the market on 37.92% of days. When we use the S&P 600 Small Cap Index as a proxy for the stock market return, we obtain similar results.

The main conclusion that can be drawn from the discussion of absolute returns is that IPO ETFs are quite but not absolutely aligned to the overall stock market. The fact that when the market moves downward, IPO ETFs have more than 20% probability of moving against the market indicates that IPO ETFs can possibly be useful hedging tools during turbulent stock markets. However, the significant number of negative return days (i.e., 37.92%) when the stock market moves upward should be borne in mind when planning investment strategies with IPO ETFs.

Taking the analysis a little further, the results on the benchmark-adjusted returns are very interesting. More specifically, during the negative days of the stock market, the benchmark-adjusted returns decline too but only on 36.51% (28.26%) of the respective trading days in the case of the S&P 500 Index (S&P 600 Small Cap Index). The opposite trend is presented when the market ascends, namely the benchmark-adjusted ETF returns decline by a rate of 61.32% (or 68.19%) trading days depending on the index used to represent the stock market. The outcomes obtained on benchmark-adjusted returns verify that IPO ETFs can be used as hedging tools over the negative paths of the stock market; however, hedging efficiency is in question when equity prices increase.

When it comes to abnormal returns, we can in see in **Table 5** that they behave qualitatively equal to benchmark-adjusted returns. In particular, they move against the negative markets on 58.86% of the corresponding negative trading days, whereas when the pricing in the market are positive, IPO ETFs have a 57.08%

Absolute returns						
Descending S&P 500 Index						
	No of neg.	**% of neg.**	**Average**	**No of pos.**	**% of pos.**	**Average**
IPO	260	71.04%	−1.103	106	28.96%	0.426
IPOS	202	77.69%	−0.564	58	22.31%	0.855
FPX	958	78.52%	−1.103	262	21.48%	0.451
FPXI	185	74.00%	−0.685	65	26.00%	0.570
Mean	**401**	**75.31%**	**−0.864**	**123**	**24.69%**	**0.576**
Ascending S&P 500 Index						
IPO	**No of neg.**	**% of neg.**	**Average**	**No of pos.**	**% of pos.**	**Average**
IPOS	87	21.70%	−0.419	314	78.30%	0.905
FPX	165	62.98%	−0.352	97	37.02%	1.259
FPXI	253	17.61%	−0.421	1184	82.39%	0.985
Mean	124	49.40%	−0.297	127	50.60%	0.934
	157	**37.92%**	**−0.372**	**431**	**62.08%**	**1.021**
Descending S&P 600 Small Cap Index descending						
	No of neg.	**% of neg.**	**Average**	**No of pos.**	**% of pos.**	**Average**
IPO	273	75.62%	−1.081	88	24.38%	0.386
IPOS	196	79.67%	−0.568	50	20.33%	0.903
FPX	985	78.24%	−1.089	274	21.76%	0.436
FPXI	177	74.68%	−0.680	60	25.32%	0.573
Mean	**408**	**77.05%**	**−0.855**	**118**	**22.95%**	**0.575**
Ascending S&P 600 Small Cap Index						
	No of neg.	**% of neg.**	**Average**	**No of pos.**	**% of pos.**	**Average**
IPO	74	18.23%	−0.381	332	81.77%	0.889
IPOS	171	61.96%	−0.355	105	38.04%	1.206
FPX	226	16.17%	−0.401	1172	83.83%	0.994
FPXI	132	50.00%	−0.327	132	50.00%	0.919
Mean	**151**	**36.59%**	**−0.366**	**435**	**63.41%**	**1.002**

Benchmark-adjusted returns						
	No of neg.	**% of neg.**	**Average**	**No of pos.**	**% of pos.**	**Average**
IPO	182	49.73%	−0.643	184	50.27%	0.517
IPOS	51	19.62%	−1.218	209	80.38%	0.794
FPX	555	45.49%	−0.448	665	54.51%	0.566
FPXI	78	31.20%	−0.628	172	68.80%	0.693
Mean	**217**	**36.51%**	**−0.734**	**308**	**63.49%**	**0.643**
Ascending S&P 500 Index						
	No of neg.	**% of neg.**	**Average**	**No of pos.**	**% of pos.**	**Average**
IPO	199	49.63%	−0.509	202	50.37%	0.515
IPOS	211	80.53%	−0.895	51	19.47%	1.461
FPX	681	47.39%	−0.566	756	52.61%	0.405
FPXI	170	67.73%	−0.789	81	32.27%	0.601
Mean	**315**	**61.32%**	**−0.690**	**273**	**38.68%**	**0.745**
Descending S&P 600 Small Cap Index descending						
	No of neg.	**% of neg.**	**Average**	**No of pos.**	**% of pos.**	**Average**
IPO	154	42.66%	−0.564	207	57.34%	0.547
IPOS	43	17.48%	−1.260	203	82.52%	0.944
FPX	390	30.98%	−0.477	869	69.02%	0.723
FPXI	52	21.94%	−0.681	185	78.06%	0.789
Mean	**160**	**28.26%**	**−0.745**	**366**	**71.74%**	**0.751**
Ascending S&P 600 Small Cap Index						
	No of neg.	**% of neg.**	**Average**	**No of pos.**	**% of pos.**	**Average**
IPO	220	54.19%	−0.575	186	45.81%	0.466
IPOS	217	78.62%	−1.054	59	21.38%	1.256
FPX	908	64.95%	−0.706	490	35.05%	0.458
FPXI	198	75.00%	−0.865	66	25.00%	0.661
Mean	**386**	**68.19%**	**−0.800**	**200**	**31.81%**	**0.711**
Abnormal returns						
Descending S&P 500 Index						
	No of neg.	**% of neg.**	**Average**	**No of pos.**	**% of pos.**	**Average**
IPO	177	48.36%	−0.638	189	51.64%	0.523
IPOS	73	28.08%	−1.227	187	71.92%	0.467
FPX	592	48.52%	−0.462	628	51.48%	0.557
FPXI	99	39.60%	−0.759	151	60.40%	0.509
Mean	**235**	**41.14%**	**−0.771**	**289**	**58.86%**	**0.514**
Ascending S&P 500 Index						
	No of neg.	**% of neg.**	**Average**	**No of pos.**	**% of pos.**	**Average**
IPO	199	49.63%	−0.509	202	50.37%	0.516
IPOS	191	72.90%	−0.529	71	27.10%	1.382
FPX	713	49.62%	−0.555	724	50.38%	0.405

Abnormal returns						
Ascending S&P 500 Index						
	No of neg.	**% of neg.**	**Average**	**No of pos.**	**% of pos.**	**Average**
FPXI	141	56.18%	−0.543	110	43.82%	0.721
Mean	**311**	**57.08%**	**−0.534**	**277**	**42.92%**	**0.756**
Descending S&P 600 Small Cap Index descending						
	No of neg.	**% of neg.**	**Average**	**No of pos.**	**% of pos.**	**Average**
IPO	175	48.48%	−0.619	186	51.52%	0.497
IPOS	73	29.67%	−1.211	173	70.33%	0.491
FPX	607	48.21%	−0.562	652	51.79%	0.566
FPXI	90	37.97%	−0.790	147	62.03%	0.509
Mean	**236**	**41.08%**	**−0.795**	**290**	**58.92%**	**0.516**
Ascending S&P 600 Small Cap Index						
	No of neg.	**% of neg.**	**Average**	**No of pos.**	**% of pos.**	**Average**
IPO	197	48.52%	−0.500	209	51.48%	0.508
IPOS	192	69.57%	−0.546	84	30.43%	1.243
FPX	725	51.86%	−0.560	673	48.14%	0.493
FPXI	152	57.58%	−0.551	112	42.42%	0.715
Mean	**317**	**56.88%**	**−0.539**	**270**	**43.12%**	**0.740**

This table presents a trend analysis of IPO ETF returns, which considers whether the overall stock market, successively represented by the S&P 500 Index and the S&P 600 Small Cap Index, moves upward or downward. The types of returns considered are the absolute, benchmark-adjusted returns and abnormal return of ETFs and displayed in the table are the number and percentage of days presenting negative and positive returns over the descending and the upward cycle of the stock market as well as the corresponding average returns of ETFs.

Table 5.
Market trend return analysis.

probability to present a negative abnormal return. Overall, the analysis of abnormal returns leads to conclusions similar to these reached through analyzing the benchmark-adjusted returns, namely IPO ETFs can be useful defending investment tools during bear markets, but their usefulness may be weakened during bull stock markets.

6. Conclusion

In this paper, we examine the performance of the four IPO ETFs traded on the US stock market, which invest in equity indices comprised of companies that have recently gone public. We assess the short- and long-term performance of these funds by estimating their absolute, benchmark-adjusted and abnormal returns. The benchmark-adjusted and abnormal returns are computed against the S&P 500 Index and the S&P 600 Small Cap Index.

In the short-run, we first compute the first-trading-day return of ETFs and then the average daily returns over the first 2, 3, 4, 5, 21, and 63 trading days. At the long-run level, we calculate cumulative absolute, benchmark-adjusted and abnormal returns over 6-, 12-, 18-, and 24-month investment horizons as well as over the

whole trading history of each single ETF up to October 31, 2016. The same intervals are used to compute relevant buy-and-hold returns.

Apart from computing short- and long-run returns, we use a six-factor regression model to assess the relation of ETFs' performance with certain variables, which include the market portfolio, the Fama & French size, value, investment and profitability factors and the momentum factor of Carhart. Our study concludes with a market trend analysis, which assesses the behavior of IPO ETFs during the descending and upward phases of the overall stock market.

The results obtained are very comprehensive. At first, the analysis shows that the first-day return of ETFs is positive on average terms and, consequently, significant profits can be made on the first trading day of IPO ETFs. Going further, short-term analysis shows that average daily returns weaken after the first trading day and over a period ranging up to 63 trading days after the launch of each ETF on the stock exchange. These findings lead to the conclusion that day traders would be possibly attracted by IPO ETFs, but investors with a short-term investment horizon not exceeding a quarter should probably avoid IPO ETFs as short-term profits from such investments would be in question.

When it comes to long-term performance, positive cumulative absolute returns are computed for the majority of ETFs over the various periods examined. However, when cumulative benchmark-adjusted and abnormal returns are assessed, returns are positive only over the first 6 months of trading whereas returns become negative over the next time periods under study. When we consider the long-run buy-and-hold returns, our analysis reveals that ETFs deliver such substantial returns, either in their absolute or benchmark-adjusted form. In other words, from a buy-and-hold perspective, IPO ETFs can beat the market as it is represented by S&P 500 Index or the S&P 600 Small Cap Index. In summary, the analysis of long-run performance shows that investors looking for significant profits in the long run from entering the IPO business can resort to IPO ETFs to do so.

Regarding risk-adjusted performance, the regression analysis demonstrates that only one IPO ETF can deliver robust above market performance. The specific ETF was the first to enter the IPO ETF business, and it is about 8 years older than the other funds in the sample. This element provides a hint about a positive relation between age and long-run performance of ETFs. Moreover, regression results reveal that IPO ETFs are more conservative than the market. This assertion is verified by the systematic risk of ETFs which is, on average, significantly lower than unity. Furthermore, a positive effect of the size factor on ETF performance is revealed. On the contrary, a negative relation is revealed between ETF performance and the value factor of Fama & French. When it comes to momentum, results indicate that IPO ETFs are aligned with the stock market in the short-run but they deviate from it in the long term. Going further, the results concerning the Conservative Minus Aggressive factor verify a negative relation between investment and expected rate of return. Finally, as far as the Robust Minus Weak factor is concerned, the results reveal a negative relationship between the performance of ETFs and RMW, which combined with the CMA slopes indicates that the returns of IPO ETFs resemble the returns of those firms with low profitability which nevertheless invest a lot.

In the last step, the market trend return analysis shows that when the stock market descends, the absolute return of IPO ETFs declines too on about 76% of negative trading days. On the other hand, when the market moves upward, the prices of ETFs increase on 63% of the corresponding days. The opposite behavior is displayed by the benchmark-adjusted and abnormal return of ETFs. This means that when the market goes down, the ETF benchmark-adjusted and abnormal returns move to the opposite direction with a probability of 57% or more (depending on the type of return considered and the index used as the market

portfolio). The main conclusion drawn from the market trend analysis is that IPO ETFs can be useful hedging investment tools during bear markets, but their hedging efficiency weakens during bull markets.

Author details

Gerasimos G. Rompotis
National and Kapodistrian University of Athens, Attica, Greece

*Address all correspondence to: geras3238@yahoo.gr

References

[1] Miller RE, Reilly FK. An examination of mispricing, returns, and uncertainty for initial public offerings. Financial Management. 1987;**16**(2):33-38

[2] Tinic S. Anatomy of initial public offerings of common stock. Journal of Finance. 1988;**43**(4):789-822

[3] Ibbotson RG, Sindelar JL, Ritter JR. Initial public offerings. Journal of Applied Corporate Finance. 1988;**1**: 37-45

[4] Carter RB, Manaster S. Initial public offerings and underwriter reputation. Journal of Finance. 1990;**45**(4): 1045-1067

[5] Ritter JR. The hot issue market of 1980. Journal of Business. 1984;**57**(2): 215-240

[6] Ritter JR. The costs of going public. Journal of Financial Economics. 1987;**19**: 269-281

[7] Ritter JR. The long-run performance of initial public offerings. Journal of Finance. 1991;**46**(1):2-27

[8] Loughran T, Ritter JR. Why don't issuers get upset about leaving money on the table in IPOs? Review of Financial Studies. 2002;**15**(2):413-444

[9] Loughran T, Ritter JR. Why has IPO underpricing changed over time? Financial Management. 2004;**33**(3):5-37

[10] Ritter JR. Equilibrium in the initial public offering market. Annual Review of Financial Economics. 2011;**3**:347-374

[11] Loughran T, Ritter JR, Rydqvist K. Initial public offerings: International insights. Pacific-Basin Finance Journal. 1994;**2**(2–3):165-199

[12] Ma S, Faff R. Market conditions and the optimal IPO allocation mechanism in China. Pacific-Basin Finance Journal. 2007;**15**(2):121-139

[13] Jia C, Xie Z, Zhang D. Analyst coverage in the premarket of IPOs. Working Chapter. 2014

[14] Lee PJ, Taylor SL, Walter TS. Australian IPO pricing in the short and long run. Journal of Banking & Finance. 1996;**20**(7):1189-1210

[15] Kryzanowski L, Lazrak S, Rakita I. The behavior of prices, trades and spreads for Canadian IPO's. Multinational Finance Journal. 2005;**9**(3–4):215-236

[16] Hamao Y, Packer F, Ritter JR. Institutional affiliation and the role of venture capital: Evidence from initial public offerings in Japan. Pacific-Basin Finance Journal. 2000; **8**(5):529-558

[17] Levis M. The long-run performance of initial public offerings: The UK experience 1980-1988. Financial Management. 1993;**22**:28-41

[18] Arosio R, Paleari S, Giudici G."The market performance of Italian IPOs in the long-run. Working Chapter, EFMA 2001 Lugano Meetings. 2001

[19] Chahine S. Block-holder ownership, family control and post-listing performance of French IPOs. Managerial Finance. 2007;**33**(6):388-400

[20] Loughran T, Ritter JR, Rydqvist K. Initial public offerings: International insights. Pacific-Basin Finance Journal. 1994;**2**(2-3). Available from: https://site.warrington.ufl.edu/ritter/files/2016/05/Int2016.pdf [Accessed: 11 December 2017]

[21] Ibbotson RG. Price performance of common stock new issues. Journal of Financial Economics. 1975;**2**:235-272

[22] Rajan R, Servaes H. Analyst following of initial public offerings. Journal of Finance. 1997;**52**(2):507-529

[23] Carter RB, Frederick HD, Singh AK. Underwriter reputation, initial returns, and the long-run performance of IPO stocks. Journal of Finance. 1998;**53**(1): 285-311

[24] Gompers PA, Lerner J. The really long-run performance of initial public offerings: The pre-Nasdaq evidence. Journal of Finance. 2003;**58**(4): 1355-1392

[25] How JCY, Ngo K, Verhoeven P. Dividend initiations and long-run IPO performance. Australian Journal of Management. 2011;**36**(2):267-286

[26] Moshirian F, Ng D, Wu E. Model specification and IPO performance: New insights from Asia. Research in International Business and Finance. 2010;**24**(1):62-74

[27] Kirkulak B. The initial and long-run returns of Japanese venture capital-backed and non-venture capital-backed IPOs. International Journal of Managerial Finance. 2008;**4**(2):112-135

[28] Kooli M, Suret JM. The aftermarket performance of initial public offerings in Canada. Journal of Multinational Financial Management. 2004;**14**(1): 47-66

[29] Espenlaub S, Gregory A, Tonks I. Testing the robustness of long-term under-performance of UK initial public offerings. Working Chapter. 1998

[30] Khurshed A, Mudambi R, Goergen M. On the long-run performance of IPOs. Working Chapter, University of Reading. 2000

[31] Gregory A, Guermat C, Al-Shawawreh F. UK IPOs: Long run returns, behavioural timing and pseudo timing. Journal of Business Finance and Accounting. 2010;**37**(5–6):612-647

[32] Ljungqvist AP. Pricing initial public offerings: Further evidence from Germany. European Economic Review. 1997;**41**:1309-1320

[33] Stehle R, Ehrhardt O, Przyborowsky R. Long-run stock performance of German initial public offerings and seasoned equity issues. European Financial Management Journal. 2000;**6**(2):173-196

[34] Bessler W, Kurth A. Agency problems and the performance of venture-backed IPOs in Germany: Exit strategies, lock-up periods, and bank ownership. European Journal of Finance. 2007;**13**(1):29-63

[35] Aussenegg W. Short and long-run performance of initial public offerings in the Austrian stock market. Working Chapter, Vienna University of Technology. 1997

[36] Alvarez S, Gonzalez V. Long-Run Performance of Initial Public Offerings (IPOs) in the Spanish Capital Market, Working Chapter, University of Oviedo, EFMA 2001 Lugano Meetings; 2001

[37] Boissin R, Sentis P. Long-run performance of IPOs and the role of financial analysts: Some French evidence. European Journal of Finance. 2012;**20**(2):1-25

[38] Neneh BN, Smit VA. Factors affecting the absolute and relative long-term performance of initial public offerings (IPOs) on the Johannesburg security exchange (JSE). Investment Management and Financial Innovations. 2014;**11**(4):244-253

[39] Sapusek A. Benchmark-sensitivity of IPO long-run performance: An empirical study for Germany.

Schmalenbach Business Review. 2000; **52**:374-405

[40] Karolyi GA, Martell R. Terrorism and the stock market. International Review of Applied Financial Issues and Economics. 2010;**2**(2):285-314

[41] Coakley J, Hadass L, Wood A. Hot IPOs can damage your long-run wealth! Applied Financial Economics. 2008; **18**(14):1111-1120

[42] Fama EF, French KR. Common risk factors in the returns on stocks and bonds. Journal of Financial Economics. 1993;**33**:3-56

[43] Carhart M. On persistence in mutual fund performance. Journal of Finance. 1997;**52**(1):57-82

[44] Fama EF, French KR. A five-factor asset pricing model. Journal of Financial Economics. 2015;**116**:1-22

[45] Merikas A, Gounopoulos D, Nounis C. Global shipping IPOs performance. Maritime Policy and Management. 2009;**36**(6):481-505

[46] Ahmad-Zaluki NA, Abidin S. IPO pricing in Malaysia: An analysis of REITs and non-REIts. International Journal of Economics and Management. 2011;**5**(1):319-332

[47] Younesi N, Ardekani A, Hashemijoo M. Performance of Malaysian IPOs and impact of return determinants. Journal of Business Studies Quarterly. 2012;**4**(2):140-158